

Appl. No. 10/608,351
Amdt. Dated January 17, 2005
Reply to Office Action of November 10, 2004

• • REMARKS/ARGUMENTS • •

The Official Action of November 10, 2004 has been thoroughly studied. Accordingly, the changes presented herein for the application, considered together with the following remarks, are believed to be sufficient to place the application into condition for allowance.

By the present amendment, each of the independent claims have been changed to recite that the desired metal oxide together with the additional volatile metal/metal oxide and metal halide are each in the vapor phase as the gas stream or mixture leaves the processing system, and that gas stream or mixture is fed into the mechanical separation device at a temperature at which only the desired metal oxide is a solid, thereby separating the desired metal oxide as a product having relatively few impurities.

Support for the relatively pure product that is the desired metal oxide can be found in paragraph 0024 on page 9 of applicant's specification, which is commensurate with applicants' discussion of the prior art in the Background section of the specification in which it is noted that prior art processes were only capable of producing crude rather than highly pure products.

Entry of the changes to the claims is respectfully requested.

Claims 1-27 are pending in this application.

Claims 1-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,822,410 to Matovich.

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Claims 1-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,464,753 to Horne et al.

Claims 1-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,682,586 to Frame et al.

Claims 1-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2004/0091014 to Bratina et al.

Claims 1-27 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable claims 1-45 of over Frame et al.

Claims 1-27 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable claims 1-19 of Bratina et al.

For the reasons set forth below, it is respectfully submitted that each of the pending claims are allowable over the prior art of record and therefore, each of the outstanding rejections of the claims should properly be withdrawn.

Favorable reconsideration by the Examiner is respectfully requested.

Initially it is noted that none of the prior art references relied upon by the Examiner is able to produce more than a crude zinc oxide product. In contrast, the present invention has been developed to produce a highly pure zinc product having a zinc oxide purity of 95% and greater.

Crude zinc oxide product streams that typically have zinc oxide purities in the range of from about 70 to about 85% (55 to 70% zinc) have much more limited commercial value and applications than the more highly pure zinc oxide that can be obtain by the present invention. This difference is

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significant particularly when considering not only the commercial value, but also the reduction in the amount of zinc that, if not reclaimed, would be handled and possibly discarded as hazardous waste.

The Examiner has relied upon Matovich as disclosing:

... reclamation process of metals by flash direct reduction of electric arc furnace dust (EAF) (col. 5, lines 45 to Col. 6, line 5) the conditions above the boiling points of zinc and lead the condensed metal vapor will be in "smoke" form collected by bag filters (col. 5, lines 16 to 37).

The Examiner concedes that Matovich "does not explicitly recite a 'mechanical separation device' as claimed."

However, the Examiner takes the position that:

...it would have been obvious....that the '401 conventional bag filters are equivalent to the claimed "mechanical separator device."

The Examiner further states that "the '401 settling chamber (col. 9, lines 29 to col. 10, line 38 is also equivalent to the claimed 'mechanical separation device."

Matovich is directed to a process that utilizes flash direct reduction in which a finely-divided metallic compound such as EAF is intimately mixed with a finely-divided volatile reductant such as sawdust and the mixture is entrained in a gas stream and exposed to a high level of thermal radiation to rapidly cause gasification of the reductant and flash reduction of the metal compound to its parent metal. As taught at column 5, lines 16-28, if oxides of volatile metals such as zinc and lead are present, "their final collected form will not be the larger spherical form of coalesced liquids but

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rather will be in the 'smoke' form of condensed vapors." "These condensed metal vapors are readily collected at low temperatures with conventional bag filters..."

The Examiner will note from the Tables provided by Matovich in Columns 9 and 10 that Matovich does not separate a desired metal oxide from the remaining components of the gas stream to produce a metal oxide product having relatively few impurities.

Rather, as noted above, Matovich only teaches producing a crude product when collecting the volatile metal oxides.

Accordingly it is submitted that applicants' invention is a significant improvement over Matovich that produces a product, i.e. a relatively pure metal oxide product which Matovich fails to teach or produce. The result is a product that has much greater commercial value without needing further extensive processing (as in the case of Matovich), and also a reduction in the amount of hazardous materials that, if not more completely reclaimed pose an environmental problem.

The Examiner's position on "obviousness," i.e. that the bag filters and/or settling chamber of Matovich are "equivalent" to applicants' claimed "mechanical separation device" does not address or overcome the fact that Matovich does not teach a method or apparatus for producing a highly pure product of a desired metal oxide from a hot gas stream.

It is also noted that in Matovich the zinc and lead (and other volatile metals) are in the solid form after the flash reduction.

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Applicants' claimed process requires that the hot gas stream received from the metal or metal waste processing system be at a temperature at which the desired metal oxide, and each of the at least one of an additional volatile metal/metal oxide and metal halide are all in the form of vapors.

Matovich does not teach this limitation.

The Examiner has relied upon Horne et al. as disclosing:

...a flue dust processing method carried out in an apparatus shown in Fig. 1 which includes an "optional separator."

The separator 48 separates the chloride compounds and alkali metals from the zinc, lead, and cadmium oxides (col. 6, line 36 to col. 7, line 15).

The Examiner concedes that Horne et al. "does not explicitly describe the separator 48 as a 'mechanical separation device' as claimed."

However, the Examiner states that:

...it would have been obvious....to consider the "separator 48" as a "mechanical Separation device" since the "separator 48" functions to separate gaseous material from solid material.

Horne et al. is directed to a process for processing furnace flue dust in which the flue dust is heated to cause zinc, lead and cadmium compounds to become gas-borne and thereby removed from iron, silicon, calcium, magnesium and aluminum compounds. The zinc, lead and cadmium compounds are oxidized in a retort to form particles of zinc, lead and cadmium, which particles are removed in a baghouse.

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As in the case of Matovich, it is noted that the zinc, lead and cadmium oxides in Horne et al. are already in the solid particulate form when they exit the retort.

Applicants' claimed process requires that the hot gas stream received from the metal or metal waste processing system be at a temperature at which the desired metal oxide, and each of the at least one of an additional volatile metal/metal oxide and metal halide are all in the form of vapors.

Horne et al. fails to meet this limitation.

The Examiner has relied upon Horne et al. at column 6, line 36 through column 7, line 15 as teaching an optional separator 48.

The optional separator 48 is taught by Horne et al. as being used to remove zinc, lead and cadmium oxides from gaseous chloride and alkali metal compounds, as such, Horne et al. does not use the optional separator to produce a relatively pure desired metal oxide (i.e. one with few impurities) according to the present invention.

The Examiner has relied upon Frame et al. as disclosing:

...a process for separating and recovering a desired metal oxide including collecting volatilized halogens of lead and cadmium in a bag house which is the equivalent to a "mechanical separation device" which will obviously function to carry out a method of recovering a volatile metal from a metal processing feed.

Mr. James E. Bratina is a common inventor of the present invention and of Frame et al. and is accordingly very familiar with Frame et al.

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In the Frame et al. process metal oxides in the material that is processed are reduced and released as elemental metal vapors. The volatile metal vapors are then oxidized and settle out on the kiln carts.

The process of Frame et al. is quite fundamentally different from applicants' process in that there is no hot gas stream that is received from a metal or metal waste processing system in which a desired metal oxide and at least one of an additional volatile metal/metal oxide and a metal halide are all in the form of vapors.

The Examiner has specifically relied upon Frame et al. as teaching "collecting volatized halogens of lead and cadmium in a baghouse which is the equivalent to a 'mechanical separation device' which will obviously function to carry out a method of recovering a volatile metal from a metal processing feed."

The baghouse in Frame et al. is designed and configured only to receive the exhaust gas that contains metal halides - not metal oxides.

The Examiner has relied upon Bratina et al. as claiming:

...an equivalent process because volatile metals are recovered but apparatus used to carry this out is not claimed but the specification recites a cyclone 15 and a bag filter 16 as functional to recover components and dust which devices are equivalent to the claimed "mechanical separations device."

Mr. James E. Bratina and Mr. Fred M. Fehsenfeld are the same inventive entity of the present invention and of Bratina et al. and are accordingly very familiar with Bratina et al.

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The Examiner has relied upon Bratina et al. as teaching the use of a cyclone 15 and a bag filter 16 which the Examiner concludes are "equivalent to the claimed 'mechanical separation device.'"

The Examiner will note that in Bratina et al. oxides of non-ferrous metals leave furnace 10 and are "entrained" by the stream of hot CO. That is, the oxides of non-ferrous metals (which are most probably a mixture of oxides) are solids when they are in inclined drum 13.

Bratina et al. do not separate any one (desired) metal oxide from another one. Moreover, since the feed of dust is at inlet 12, the material separated in cyclone 15 would include particulate material other than metal oxides from the dust that becomes entrained in the gas flow.

In Bratina et al. the sock or bag filter is provided to recover dust prior to chimney 17.

There is no teaching in Bratina et al. of recovering a desired metal oxide at a relatively pure content according to the present invention.

Based upon the above distinctions between the prior art relied upon by the Examiner and the present invention, and the overall teachings of prior art, properly considered as a whole, it is respectfully submitted that the Examiner cannot rely upon the prior art as required under 35 U.S.C. §103 to establish a *prima facie* case of obviousness of applicants' claimed invention.

It is, therefore, submitted that any reliance upon prior art would be improper inasmuch as the prior art does not remotely anticipate, teach, suggest or render obvious the present invention.

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It is submitted that the claims, as now amended, and the discussion contained herein clearly show that the claimed invention is novel and neither anticipated nor obvious over the teachings of the prior art and the outstanding rejections of the claims should hence be withdrawn.

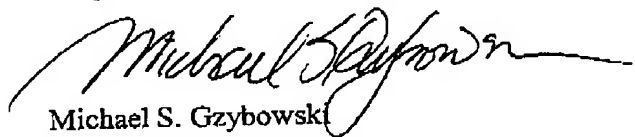
Therefore, reconsideration and withdrawal of the outstanding rejection of the claims and an early allowance of the claims is believed to be in order.

It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

If upon consideration of the above, the Examiner should feel that there remains outstanding issues in the present application that could be resolved, the Examiner is invited to contact applicants' patent counsel at the telephone number given below to discuss such issues.

To the extent necessary, a petition for an extension of time under 37 CFR §1.136 is hereby made. Please charge the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 12-2136 and please credit any excess fees to such deposit account.

Respectfully submitted,



Michael S. Gzybowski
Reg. No. 32,816

BUTZEL LONG
350 South Main Street
Suite 300
Ann Arbor, Michigan 48104
(734) 995-3110